

PATENT ABSTRACTS OF JAPAN

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(54) MATERIAL FOR FORMING PROTECTIVE FILM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a material for forming a protective film in which no void is formed, even if the aspect ratio of a hole is increased and moreover no difference in the film thickness is produced between a Dense part and an Iso part, when the material for forming a protective film is provided thereon.

SOLUTION: In a composition comprising a solid content containing a resin component and a crosslinking agent at a mass ratio of 2:8 to 4:6 and an organic solvent, mass average molecular weight of the solid component is adjusted to be in a range of 1,300-4,500.

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CLAIMS

[Claim(s)]

[Claim 1] The protective coat formation ingredient for dual DAMASHIN processes characterized by adjusting the mass mean molecular weight of the above-mentioned solid content to the range of 1300-4500 in the constituent which consists of solid content which contains a resinous principle and a cross linking agent component at a mass ratio 2:8 thru/or a rate of 4:6, and an organic solvent.

[Claim 2] The protective coat formation ingredient for dual DAMASHIN processes according to claim 1 which has the mass mean molecular weight of the resinous principle in solid content in the range of 4000-15000.

[Claim 3] The protective coat formation ingredient for dual DAMASHIN processes according to claim 1 or 2 whose resinous principle is acrylic resin.

[Claim 4] The protective coat formation ingredient for dual DAMASHIN processes according to claim 1 to 3 whose cross linking agent component is the compound which has triazine structure.

[Claim 5] The protective coat formation ingredient for dual DAMASHIN processes according to claim 4 which has the mass mean molecular weight of a cross linking agent component in the range of 500-1000.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] In the fine structure resist pattern used for a dual DAMASHIN process, in case this invention prepares a protective coat, it relates to the protective coat formation ingredient which can carry out flattening of the thickness difference produced between a high density pattern part and an isolated pattern part.

[0002]

[Description of the Prior Art] The dual DAMASHIN process which embeds a metallic material with plating and forms wiring has come to attract attention instead of processing the conventional metal membrane by etching and forming wiring of an electron device, while using copper as a wiring material is examined, in order to solve the problem of wiring resistance or wiring delay about a semiconductor integrated circuit recently.

[0003] By the way, in preparing a trench hole (wiring gutter) according to this dual DAMASHIN process after forming a beer hall (connection slot), in order for the wiring material already prepared in the substrate front face to prevent being damaged at the time of the trench formation after hole formation, it is necessary to prepare a protective coat in a hole. And about such a protective coat, the pad property for embedding without a clearance the inside of the acid-resisting property of preventing the echo from the substrate of an exposure radiation, and a hole, and the flattening property which makes thickness of the substrate after a pad regularity are demanded.

[0004] By the way, although the organic system ingredient, for example, a photoresist ingredient meltable to an alkali developer, is usually used as a protective coat (JP,10-223755,A) In these organic system ingredients, if the aspect ratio of a hole becomes large Form air bubbles, i.e., a void, in a hole at the time of BEKU, and the protective effect of a metallic material turns to imperfection up, and If it applies on the substrate containing a high density pattern part (henceforth the Dense section), and an isolated pattern part (henceforth the Iso section) and paint film formation is carried out as shown in drawing 1 A thickness difference is produced to a pattern and the fault of having an adverse effect on the lithography processing for consecutive trench formation is produced.

[0005]

[Problem(s) to be Solved by the Invention] This invention conquers the fault which such a conventional protective coat formation ingredient has, and also when it moreover prepares on the Dense section and the Iso section, without forming a void even if the aspect ratio of a hole becomes large, it is made for the purpose of offering the protective coat formation ingredient which does not produce a thickness difference among both.

[0006]

[Means for Solving the Problem] The result of having repeated research wholeheartedly in order that this invention persons might conquer the fault which the conventional protective coat formation ingredient in a dual DAMASHIN process has, If a protective coat is made to form with the ingredient which contained the resinous principle and the cross linking agent component at a specific rate, and the solid content in it adjusted within the limits of specific mass average molecular weight Formation of the void in a hole can be controlled and it came to make this invention for the ability of thickness between the Dense section and the Iso section to be fixed moreover based on a header and this knowledge.

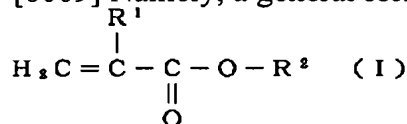
[0007] That is, this invention offers the protective coat formation ingredient for dual DAMASHIN processes characterized by adjusting the mass mean molecular weight of the above-mentioned solid content to the range of 1300-4500 in the constituent which consists of solid content which contains a resinous principle

and a cross linking agent component at a mass ratio 2:8 thru/or a rate of 4:6, and an organic solvent.

[0008]

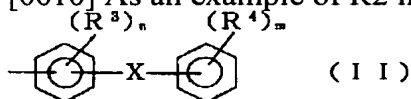
[Embodiment of the Invention] The protective coat formation ingredient of this invention consists of a constituent which dissolved the solid content which consists of a resinous principle and a cross linking agent component in the organic solvent. And the polymer or copolymer obtained especially as the above-mentioned resinous principle, for example, using ester with at least one sort of hydroxy compounds, acrylic acid, or methacrylic acid chosen from the bis-phenyl sulfones which have at least one hydroxyl group, benzophenones, anthracene, and naphthalene as a part of monomer [at least] although a polyamide acid, polysulfone, a halogenation polymer, a polybutene sulfonic acid, acrylic resin, etc. are used is desirable.

[0009] Namely, a general formula [** 1]

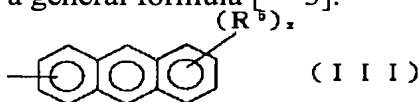


The polymer of the acrylic acid or methacrylic ester expressed with (R1 in a formula is a hydrogen atom or a methyl group, and R2 is the residue excluding the hydrogen atom from the hydroxyl group of the hydroxyl compound chosen from bis-phenyl sulfones with at least one hydroxyl group, benzophenones, anthracene, and naphthalene), these and other acrylic acids, or a copolymer with methacrylic ester is desirable.

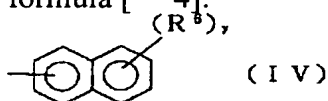
[0010] As an example of R2 in this general formula (I), it is a general formula [** 2].



They are the bis-phenyl sulfone residue expressed with (a -SO2-radical or a -CO-radical, and R3 and R4 are [4 or less and m of a hydrogen atom, hydroxyl-group, alkyl group, alkoxy group, halogen atom, amino-group, low-grade dialkylamino radical, carboxyl group, tert-butoxy radical, tert-butoxycarbonyloxy radical, low-grade alkoxyalkyl group, and low-grade hydroxyalkyl radical, a tetrahydropyranyloxy radical or a tetrahydrofuranyl oxy-radical, and n] five or less integers for X in a formula) or benzophenone residue, and a general formula [** 3].



They are the anthryl radical expressed with (R5 in a formula is a hydroxyl-group, alkyl group, alkoxy group, halogen atom, amino-group, low-grade dialkylamino radical, carboxyl group, tert-butoxy radical, tert-butoxycarbonyloxy radical, low-grade alkoxyalkyl group, and low-grade hydroxyalkyl radical, a tetrahydropyranyloxy radical, or a tetrahydrofuranyl oxy-radical, and x is eight or less integer), or a general formula [** 4].



The naphthyl group expressed with (R6 in a formula is a hydroxyl-group, alkyl group, alkoxy group, halogen atom, amino-group, low-grade dialkylamino radical, carboxyl group, tert-butoxy radical, tert-butoxycarbonyloxy radical, low-grade alkoxyalkyl group, and low-grade hydroxyalkyl radical, a tetrahydropyranyloxy radical, or a tetrahydrofuranyl oxy-radical, and y is six or less integer) can be mentioned.

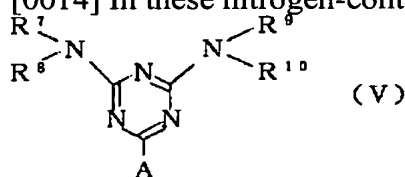
[0011] therefore, as an example of the monomer which constitutes a resinous principle A screw (4-hydroxyphenyl) sulfone, a screw (3-hydroxyphenyl) sulfone, A screw (2-hydroxyphenyl) sulfone, a screw (2, 4-dihydroxy phenyl) sulfone, A screw (3, 4-dihydroxy phenyl) sulfone, a screw (3, 5-dihydroxy phenyl) sulfone, A screw (3, 6-dihydroxy phenyl) sulfone, screw (3, 5-dimethyl-4-hydroxyphenyl) sulfones, and these hydroxyl groups leave at least one piece. A tert-butoxy radical, The compound permuted by the tert-butoxycarbonyloxy radical, the ethoxy ethoxy radical, and the tetra-hydroxy pyranyl oxy-radical, 2, 4-dihydroxy benzophenone, 2 and 3, 4-trihydroxy benzophenone, A 2, 2', 4, and 4'-tetra-hydroxy benzophenone, 2, 2', 5, a 6'-tetra-hydroxy benzophenone, 2-hydroxy-4-methoxybenzophenone, 2-hydroxy-

4-octoxybenzophenone, 2-hydroxy-4-dodecyloxy benzophenone, 2, and 2'-dihydroxy-4-methoxybenzophenone, A 2, 6-dihydroxy-4-methoxybenzophenone, 2, 2'-dihydroxy-4, and 4'-dimethoxy benzophenone, A 4-amino-2'-hydroxy benzophenone, a 4-dimethylamino-2'-hydroxy benzophenone, A 4-diethylamino-2'-hydroxy benzophenone, a 4-dimethylamino-4'-methoxy-2'-hydroxy benzophenone, 4-dimethylamino-2' and 4'-dihydroxy benzophenone and 4-dimethylamino-3' and 4'-dihydroxy benzophenones and these hydroxides leave at least one piece. A tert-butoxy radical, The compound permuted by the tert-butoxycarbonyloxy radical, the ethoxy ethoxy radical, and the tetra-pyranyl oxy-radical, A 1-hydroxy anthracene, a 9-hydroxy anthracene, 1, 2-dihydroxy anthracene, 1, 5-dihydroxy anthracene, 9, 10-dihydroxy anthracene, 1, 2, 3-trihydroxy anthracene, 1, 2 and 3, a 4-tetra-hydroxy anthracene, 1, 2, 3, 4, 5, 6-hexa hydroxy anthracene, 1, 2, 3, 4, 5, 6 and 7, 8-OKUTA hydroxy anthracene, 1-hydroxymethyl anthracene, 9-hydroxymethyl anthracene, 1-hydroxyethyl anthracene, 9-hydroxyethyl anthracene, A 9-hydroxy hexyl anthracene, a 9-hydroxy octyl anthracene, 9, 10-dihydroxy methyl anthracene, 9-anthracene carboxylic acid, A glycidyl-ized anthracene carboxylic acid, glycidyl-ized anthryl methyl alcohol, Anthryl methyl alcohol, a multiple-valued carboxylic acid, for example, oxalic acid, a malonic acid, A methylmalonic acid, an ethyl malonic acid, a dimethyl malonic acid, a succinic acid, a methyl succinic acid, A condensation product with 2 and 2-dimethyl succinic acid, a glutaric acid, an adipic acid, and a pimelic acid, 1-naphthol, 2-naphthol, naphthalene diol, naphthalenetriol, 1-naphthalene methanol, 2-naphthalene methanol, 1-(2-naphthyl) ethanol, a naphthalene carboxylic acid, a 1-naphthol-4-carboxylic acid, 1, 8-naphthalene dicarboxylic acid, naphtholsulfonic acid, etc. can be mentioned. Moreover, as for the substituent expressed with above-mentioned general formula (II) - (IV), it is desirable to use the high thing of absorption to the wavelength of the exposure light used. For example, when i line (365nm) is used, a benzophenone system substituent is desirable, and when a KrF excimer laser (248nm) is used, a sulfone system or an anthracene system substituent is desirable. The mass average molecular weight of these resinous principles has the desirable thing of the range of 4000-15000.

[0012] Moreover, the nitrogen-containing compound which has at least two amino groups permuted by the thing which has the functional group which can form bridge formation between selves or the resinous principle used together with heating as a cross linking agent component, for example, a hydroxyalkyl radical, the alkoxyalkyl group, or its both can be mentioned. As such a compound, there are the melamine and urea with which the hydrogen atom of the amino group was permuted by the methylol radical, the alkoxy methyl group, or its both, for example, guanamine, benzoguanamine, glycoluril, a succinyl amide, an ethylene urea, etc.

[0013] These nitrogen-containing compounds can be easily obtained making a melamine, a urea, guanamine, benzoguanamine, glycoluril, a succinyl amide, an ethylene urea, etc. react with formalin in ebullition underwater, and methylol-izing them, or by making lower alcohol still like methyl alcohol, ethyl alcohol, n-propyl alcohol, and isopropyl alcohol react to this, and carrying out alkoxy **.

[0014] In these nitrogen-containing compounds, it is especially a general formula [** 5].



(Although A in a formula shows a hydrogen atom, an alkyl group, an aralkyl radical, an aryl group, or 11R12 -NR(s), it is whether R7, R8, R9, R10, R11, and R12 are mutually the same and a different thing and a hydrogen atom, a methylol radical, or an alkoxy methyl group is shown, respectively) at least two in 4-612 which exist in a molecule, R7, R8, R9, R10, R11, and R12, -- a methylol radical or an alkoxy methyl group - it is -- since the compound expressed has good crosslinking reaction nature, it is desirable. As for the melamine derivative of the compound expressed with this general formula, what ***** per melamine ring, a methylol radical, or six alkoxy an average of three or more piece methyl groups is desirable. As an example of such a melamine derivative or a benzoguanamine derivative MX-750 by which an average of 3.7 methoxymethyl radicals are permuted per triazine ring of a commercial item, and MW-30 (all are Sanwa chemical company make) by which an average of 5.8 methoxymethyl radicals are permuted per triazine ring, Methoxymethyl-ized melamines, such as Cymel 300, 301, 303, 350, 370, 771, 325, 327, 703, and 712, Methoxymethyl-ized butoxy methylation melamines, such as Cymel 235, 236, 238, 212, 253, and 254, Butoxy methylation melamines, such as Cymel 506 and 508, a carboxyl group content methoxymethyl-ized iso butoxy methylation melamine like Cymel 1141, Methoxymethyl-ized ethoxy methylation

benzoguanamine like Cymel 1123, Methoxymethyl-ized butoxy methylation benzoguanamine like Cymel 1123-10, Butoxy methylation benzoguanamine like Cymel 1128, carboxyl group content methoxymethyl-ized ethoxy methylation benzoguanamine (all are the Mitsui Cyanamid make) like Cymel 1125-80, etc. are mentioned. Moreover, as an example of glycoluril, butoxy methylation glycoluril like Cymel 1170, methylol-ized glycoluril like Cymel 1172, etc. are mentioned.

[0015] Moreover, in this invention, these cross linking agents may be used independently, and two or more sorts may be combined and they may be used. As for these cross linking agent components, it is desirable that the mass average molecular weight uses the thing of 500-1000.

[0016] Moreover, 1300-4500, and that it is especially 2000-4000 have the desirable mass average molecular weight of solid content which consists of the above-mentioned resinous principle and a cross linking agent component in this invention. In addition, if this range is exceeded, the clearance called a void will be generated and the function as a protective coat will be reduced to the interior of a hole. Moreover, if less than this range, between Dense and Iso, a thickness difference will arise and control of subsequent etching will become very difficult. The mass mean molecular weight of this solid content is obtained by GPC measurement (polystyrene system gel is used for a column and it is a product made from SHODEX, and "GPC SYSTEM-21" in equipment).

[0017] As an organic solvent in this invention, if the two above-mentioned component may be dissolved, what kind of thing may be used and there will be especially no limit. As an example of such a thing, an acetone, a methyl ethyl ketone, cyclopentanone, Ketones, such as a cyclohexanone, methyl isoamyl ketone, 2-heptanone, 1 and 1, and a 1-trimethyl acetone Ethylene glycol and ethylene glycol mono-acetate, diethylene-glycol, or diethylene-glycol mono-acetate, Or polyhydric alcohol, such as these monomethyl ether, the monopropyl ether, the monobutyl ether, or the monophenyl ether, and the derivative of those, There is ester, such as cyclic ether like dioxane, and ethyl lactate, methyl acetate, ethyl acetate, butyl acetate, methyl pyruvate, pyruvic-acid ethyl, 3-methoxy methyl propionate, 3-ethoxy ethyl propionate. These may be used independently, and may mix and use two or more sorts.

[0018] Moreover, into the protective coat formation ingredient of this invention, a surfactant can also be added by request for improvement in spreading nature, or striae SHON prevention. As such a surfactant, fluorochemical surfactants, such as Sir chlorofluocarbon SC-103, SR-100 (Asahi Glass Co., Ltd. make), EF-351 (northeast fertilizer company make), Fluorad Fc-431, Fluorad Fc-135, Fluorad Fc-98, Fluorad Fc-430, and Fluorad Fc-176 (Sumitomo 3 M company make), can be mentioned, for example. It is desirable to choose in less than 2000 ppm to the solid content of the solution for formation of an antireflection film layer as an addition in this case.

[0019] Although the protective coat formation ingredient of this invention is suitable for applying on the substrate which has the pattern which consists of the Dense section and the Iso section As the relation between this Dense section and the Iso section is shown in drawing 2 That in which the Iso section which consists of a hole which carried out ***** isolation of the fixed distance which the hole whose Dense section is plurality crowds in the distance within about 2 to 3 times or it of the diameter of the hole, and is beyond the aforementioned distance is prepared is said.

[0020]

[Example] Next, an example and the example of a comparison explain this invention to a detail further. In addition, three holes with a diameter of 250nm are prepared as a Dense section at spacing which is 500nm, and the sample of the hole pattern of the Dense section-Iso section used in each example separates 5000nm from the hole of the outermost part of the Dense section as an Iso section, and has the same hole as the above.

[0021] The mass average molecular weight whose mass average molecular weight which is acrylic resin which has example 1 dihydroxy phenyl sulfone structure is PAC102 (die toe company make) of 5821 and a melamine derivative dissolved the mixture [of 599] of MX-750 (Sanwa chemical company make) of 6:4 in propylene glycol, made this solid content concentration 2 mass %, and the protective coat formation ingredient was prepared. The solid content mass average molecular weight in this case was 4226. Moreover, spinner spreading of the above-mentioned protective coat formation ingredient was carried out, and the protective coat was made to form on a hole pattern. [to the substrate with which the hole pattern of the Dense section-Iso section as shown in drawing 2 was formed] [180 degrees C] [for 90 seconds] When the sectional view was observed by SEM (scanning electron microscope), there was no generating of the void inside a pattern and the thickness difference between the Dense section-Iso section patterns was about 243nm.

[0022] The protective coat was made to form on a hole pattern by the same actuation as an example 1 except

having set to 4:6 PAC102 which used in the example 2 example 1, and the blending ratio of coal of MX-750. The solid content mass average molecular weight in this case was 3235. Consequently, there was also no generating of a void into a pattern and the thickness difference between the Dense section-Iso sections was about 209.5nm.

[0023] The protective coat was made to form on a hole pattern by the same actuation as an example 1 except having set to 8:2 PAC102 which used in the example of comparison 1 example 1, and the blending ratio of coal of MX-750. The solid content mass average molecular weight in this case was 5086. Consequently, since the void occurred in the hole, a hole was not able to be embedded thoroughly.

[0024] The protective coat was made to form on a hole pattern by the same actuation as an example 1 except having set to 1:9 PAC102 which used in the example of comparison 2 example 1, and the blending ratio of coal of MX-750. The solid content mass average molecular weight in this case was 1268. Consequently, although there was no generating of a void into a pattern, the thickness difference between the Dense section-Iso sections was set to 425.2 micrometers, and became the failure of the lithography process after it.

[0025]

[Effect of the Invention] If the protective coat formation ingredient of this invention is used, when preparing a protective coat on the fine structure resist pattern formed in the dual DAMASHIN process, flattening of the thickness difference produced between the Dense section and the Iso section can be carried out, and lithography processing for consecutive trench formation can be performed smoothly.

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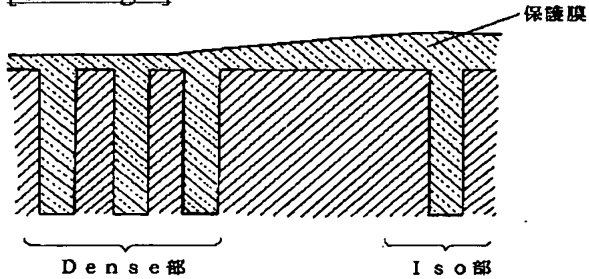
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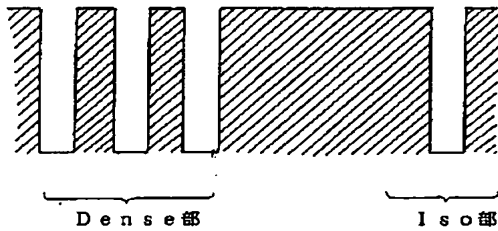
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DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]

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CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
 [Category partition] The 2nd partition of the 7th category
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 [The 7th edition of International Patent Classification]

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[FI]

H01L 21/90 Z
 21/312 A

[Procedure amendment]
 [Filing Date] January 27, Heisei 15 (2003. 1.27)
 [Procedure amendment 1]
 [Document to be Amended] Description
 [Item(s) to be Amended] 0011
 [Method of Amendment] Modification
 [Proposed Amendment]

[0011] Therefore, it is an example of the monomer which constitutes a resinous principle, A screw (4-hydroxyphenyl) sulfone, a screw (3-hydroxyphenyl) sulfone, A screw (2-hydroxyphenyl) sulfone, a screw (2, 4-dihydroxy phenyl) sulfone, A screw (3, 4-dihydroxy phenyl) sulfone, a screw (3, 5-dihydroxy phenyl) sulfone, A screw (3, 6-dihydroxy phenyl) sulfone, screw (3, 5-dimethyl-4-hydroxyphenyl) sulfones, and these hydroxyl groups leave at least one piece. A tert-butoxy radical, The compound permuted by the tert-butoxycarbonyloxy radical, the ethoxy ethoxy radical, and the tetrahydropyranyloxy radical, 2, 4-dihydroxy benzophenone, 2 and 3, 4-trihydroxy benzophenone, A 2, 2', 4, and 4'-tetra-hydroxy benzophenone, 2, 2', 5, a 6'-tetra-hydroxy benzophenone, 2-hydroxy-4-methoxybenzophenone, 2-hydroxy-4-octoxybenzophenone, 2-hydroxy-4-dodecyloxy benzophenone, 2, and 2'-dihydroxy-4-methoxybenzophenone, A 2, 6-dihydroxy-4-methoxybenzophenone, 2, 2'-dihydroxy-4, and 4'-dimethoxy benzophenone, A 4-amino-2'-hydroxy benzophenone, a 4-dimethylamino-2'-hydroxy benzophenone, A 4-diethylamino-2'-hydroxy benzophenone, a 4-dimethylamino-4'-methoxy-2'-hydroxy benzophenone, 4-dimethylamino-2' and 4'-dihydroxy benzophenone and 4-dimethylamino-3' and 4'-dihydroxy benzophenones and these hydroxyl groups leave at least one piece. A tert-butoxy radical, The compound permuted by the tert-butoxycarbonyloxy radical, the ethoxy ethoxy radical, and the tetrahydropyranyloxy radical, A 1-hydroxy anthracene, a 9-hydroxy anthracene, 1, 2-dihydroxy anthracene, 1, 5-dihydroxy anthracene, 9, 10-dihydroxy anthracene, 1, 2, 3-trihydroxy anthracene, 1, 2 and 3, a 4-tetra-hydroxy anthracene, 1, 2, 3, 4, 5, 6-hexa hydroxy anthracene, 1, 2, 3, 4, 5, 6 and 7, 8-OKUTA hydroxy anthracene, 1-hydroxymethyl anthracene, 9-hydroxymethyl anthracene, 1-hydroxyethyl anthracene, 9-hydroxyethyl anthracene, A 9-hydroxy hexyl anthracene, a 9-hydroxy octyl anthracene, 9, 10-dihydroxy methyl anthracene, 9-anthracene

carboxylic acid, A glycidyl-ized anthracene carboxylic acid, glycidyl-ized anthryl methyl alcohol, Anthryl methyl alcohol, a multiple-valued carboxylic acid, for example, oxalic acid, a malonic acid, A methylmalonic acid, an ethyl malonic acid, a dimethyl malonic acid, a succinic acid, a methyl succinic acid, A condensation product with 2 and 2-dimethyl succinic acid, a glutaric acid, an adipic acid, and a pimelic acid, 1-naphthol, 2-naphthol, naphthalene diol, naphthalenetriol, 1-naphthalene methanol, 2-naphthalene methanol, 1-(2-naphthyl) ethanol, a naphthalene carboxylic acid, a 1-naphthol-4-carboxylic acid, 1, 8-naphthalene dicarboxylic acid, naphtholsulfonic acid, etc. can be mentioned. Moreover, as for the substituent expressed with above-mentioned general formula (II) - (IV), it is desirable to use the high thing of absorption to the wavelength of the exposure light used. For example, when i line (365nm) is used, a benzophenone system substituent is desirable, and when a KrF excimer laser (248nm) is used, a sulfone system or an anthracene system substituent is desirable. The mass average molecular weight of these resinous principles has the desirable thing of the range of 4000-15000.

[Procedure amendment 2]

[Document to be Amended] Description

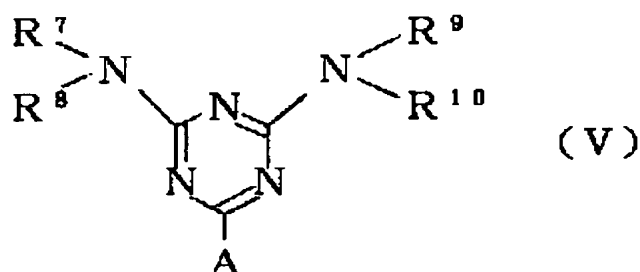
[Item(s) to be Amended] 0014

[Method of Amendment] Modification

[Proposed Amendment]

[0014] In these nitrogen-containing compounds, it is especially a general formula.

[Formula 5]



(A in a formula showing a hydrogen atom, an alkyl group, an aralkyl radical, an aryl group, or 11R12 -NR (s), and being whether R7, R8, R9, R10, R11, and R12 are mutually the same and a different thing.) at least two in 4-612 which exist in a molecule although a hydrogen atom, a methylol radical, or an alkoxy methyl group is shown, respectively, R7, R8, R9, R10, R11, and R12, -- a methylol radical or an alkoxy methyl group -- it is -- since the compound expressed has good crosslinking reaction nature, it is desirable. As for the triazine derivative of the compound expressed with this general formula, what ***** per triazine ring, a methylol radical, or six alkoxy an average of three or more piece methyl groups is desirable. As the example of such a triazine derivative or a benzoguanamine derivative, MX-750 by which an average of 3.7 methoxymethyl radicals are permuted per triazine ring of a commercial item, and MW-30 (all are Sanwa chemical company make) by which an average of 5.8 methoxymethyl radicals are permuted per triazine ring, Methoxymethyl-ized melamines, such as Cymel 300, 301, 303, 350, 370, 771, 325, 327, 703, and 712, Methoxymethyl-ized butoxy methylation melamines, such as Cymel 235, 236, 238, 212, 253, and 254, Butoxy methylation melamines, such as Cymel 506 and 508, a carboxyl group content methoxymethyl-ized iso butoxy methylation melamine like Cymel 1141, Methoxymethyl-ized ethoxy methylation benzoguanamine like Cymel 1123, Methoxymethyl-ized butoxy methylation benzoguanamine like Cymel 1123-10, Butoxy methylation benzoguanamine like Cymel 1128, carboxyl group content methoxymethyl-ized ethoxy methylation benzoguanamine (all are the Mitsui Cyanamid make) like Cymel 1125-80, etc. are mentioned. Moreover, as an example of glycoluril, butoxy methylation glycoluril like Cymel 1170, methylol-ized glycoluril like Cymel 1172, etc. are mentioned.

[Translation done.]